colloids are more important than the inorganic in furnishing hydrogen-ion to be neutralized by lime. The lack of relation between P_H and organic matter is not opposed to this, for the amount of organic acids needed to yield the P_H values shown is infinitesimal in comparison with the total organic content.

Summary.—In this paper lime-requirement is stated in parts per thousand of CaO; and, because of the ease with which relative values can be appreciated, active soil acidity is stated in the form of specific acidity. The ratio between these in a given soil may be expressed by a correlation coefficient C obtained by the equation: L.R. = C × (S.A. − 1). The value of C is believed to be a measure of the adsorptive power of the soil colloids for hydrogen-ion.

The coefficient C has been found to vary so widely from one soil to another, from an untreated to a limed soil, and even from one depth to another in the same soil, that it is impracticable to calculate lime-requirement from acidity determinations in general, as has been proposed. Soils may be roughly classified on the basis of the value of C, a convenient ratio between classes being $\sqrt[3]{10}$; but only if some simple procedure is first devised for classifying a given soil can there be obtained from its specific acidity a value for its lime-requirement.

BOTANY.—*Two new genera related to* Narvalina. S. F. Blake, Bureau of Plant Industry.

The type species of *Narvalina, N. domingensis* (Cass.) Less., is a shrub known only from the island of Hispaniola (Santo Domingo) in the West Indies. It is closely allied to the widespread and variable genus *Bidens* to which our "sticktights" or "devil's pitchforks" belong, being distinguished chiefly by its shrubby habit, coriaceous leaves, and wing-margined achenes. Although still rare in herbaria, at least in this country, it is represented in the National Herbarium by two sheets of excellent specimens collected by Mr. Emery C. Leonard, who accompanied Dr. W. L. Abbott on a collecting trip to Haiti in 1920.

Up to 1900 only the original species had been referred to the genus. In that year three new species were described from Ecuador by the German student of Asteraceae, Georg Hieronymus. All three are now represented in the U. S. National Herbarium by fragments of the types recently received from Berlin. Study of these fragments, consisting of fruiting heads accompanied by portions of the leaves, shows that they represent two rather remarkable new genera.

One of these, to which belong *Narvalina corazonensis* and *N. homogama* of Hieronymus, includes also the Peruvian plant lately described as *Bidens mirabilis* Sherff. Dr. Earl E. Sherff, who has been occupied for some years in a revision of the genus *Bidens*, ascribed his new species to that genus with some hesitation, and as the result of renewed study of the plant has come independently to the conclusion that it must be distinguished generically. The new genus, which it is proposed to name *Ericentrodea*[1] in allusion to its numerous pappus awns, is accordingly published jointly by Dr. Sherff and the writer. It is distinguished from *Narvalina* by having the achene distinctly contracted at apex into a short neck or collar produced, at least in two of the species, into two very short branches each bearing about 3 to "8" fragile, retrorsely hispid awns. It differs from *Bidens* in the same features, as well as in the presence of achene wings, which, however, are nearly obsolete in *N. homogama*, or even completely so in *B. mirabilis*.

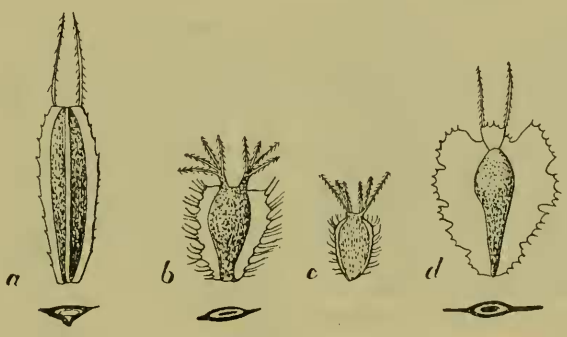

Fig. 1. *a*, achene of *Narvalina domingensis* (Cass.) Less. (*Leonard* 4832); *b*, *Ericentrodea corazonensis* (Hieron.) Blake & Sherff (*Sodiro* 44/2); *c*, *E. homogama* (Hieron.) Blake & Sherff (*Sodiro* 44/1); *d*, *Cyathomone sodiroi* (Hieron.) Blake (*Sodiro* 44/3). All × 3.

The other genus, represented only by *Narvalina sodiroi* Hieron., has a very broadly winged achene (similar in aspect to that of *Verbesina*, but obcompressed), bearing a pappus consisting of 2 very fragile awns and a turbinate spinulose-ciliolate corona about 1 mm. high, often adnate to the wings.

The distinctive characters of the three genera here considered are given in the following key.

[1] ἐρῐ, *much*, κεντρωδης, *prickly*.

Achene not contracted at apex; pappus of 2 awns only.....1. *Narvalina*.
Achene contracted into a neck or collar at apex.
Pappus of about 6 to 15 awns, more or less distinctly aggregated in two groups over the angles of the achene.....2. *Ericentrodea*.
Pappus of 2 awns and a turbinate corona.....3. *Cyathomone*.

1. **Narvalina** Cass. Dict. Sci. Nat. **38**: 17. 1825.

Needhamia Cass. Dict. Sci. Nat. **34**: 335. 1825. Not *Needhamia* R. Br. 1810.

1. NARVALINA DOMINGENSIS (Cass.) Less. Syn. Comp. 234. 1832. Fig. 1, *a*.
Needhamia domingensis Cass. Dict. Sci. Nat. **34**: 336. 1825.
Narvalina fruticosa Urban, Symb. Antill. **5**: 265. 1907, excluding *Bidens fruticosa* L., the name-bringing synonym.[2]
TYPE LOCALITY: Santo Domingo.
SPECIMENS EXAMINED: HAITI: Shrub 5 to 7 ft. high, occasional in arid thickets, vicinity of Pétionville, alt. 350 m., June, 1920, *Leonard* 4832 (U. S. Nat. Herb.); shrub 4 to 5 ft. high, scarce, vicinity of Fond Parisien, Etang Saumatre, May, 1920, *Leonard* 4098 (U. S. Nat. Herb.).

2. **Ericentrodea** Blake & Sherff, gen. nov.

Scandent shrubs or herbs (?), with opposite, petiolate, ternate or biternately divided, coriaceous leaves and cymose-panicled, discoid or radiate, yellow heads; involucre double, as in *Bidens*, the outer phyllaries small, herbaceous, the inner submembranous, lineate; receptacle flattish; pales flattish, membranous, lineate; rays when present pistillate, fertile; disk flowers[3] hermaphrodite, the corollas tubular, with slender tube, funnelform throat, and 5 short teeth; anthers with cordate-sagittate bases and ovate terminal appendages; style exserted, the branches short, with triangular, acuminate, papillose appendages; achenes strongly obcompressed, the obovate body distinctly or obsoletely 2-winged, coarsely ciliate on the lobulate margin, contracted at apex into a short neck or collar; pappus awns about 6 to 15, fragile, in two groups of 3 to "8" over the angles of the achene, those of each group usually more or less connate at base, with 2 or 3 shorter intermediate awns sometimes present on each side of achene between them.
Type species *Narvalina corazonensis* Hieron.

Heads radiate, in fruit about 1.7 cm. thick, 9 mm. high (corollas not included); lower leaves ternate, the upper simple..... 1. *E. corazonensis*.
Heads discoid, in fruit about 1 cm. thick, 6 mm. high (corollas not included); lower leaves biternate, the upper ternate or simple.
Heads with 20 or more flowers; lower leaves biternate, the terminal divisions unlobed; pedicels up to 3 cm. long..... 2. *E. homogama*.
Heads about 12-flowered; lower leaves biternate, the terminal segments trilobate; pedicels about 1 cm. long..... 3. *E. mirabilis*.

1. **Ericentrodea corazonensis** (Hieron.) Blake & Sherff. Fig. 1, *b*.
Narvalina corazonensis Hieron. Bot. Jahrb. Engler **29**: 49. 1900.
SPECIMEN EXAMINED: ECUADOR: Subandine woods, Mount Corazón, altitude 2,000 meters, *Sodiro* 44/2 (fragments of type coll.; U. S. Nat. Herb. no. 1,059,379).

2. **Ericentrodea homogama** (Hieron.) Blake & Sherff. Fig. 1, *c*.
Narvalina homogama Hieron. Bot. Jahrb. Engler **29**: 48. 1900.

[2] See Blake, Journ. Bot. Brit. & For. **53**: 13–14. 1915.
[3] The floral characters are drawn from material of *E. mirabilis*.

SPECIMEN EXAMINED: ECUADOR: Subandine woods, between Cotocallao and Nono, *Sodiro* 44/1 (fragments of type coll.; U. S. Nat. Herb. no. 1,059,381).

3. **Ericentrodea mirabilis** (Sherff) Blake & Sherff.

Bidens mirabilis Sherff, Bot. Gaz. **61**: 496. *pl. 31*. 1916.

SPECIMEN EXAMINED: PERU: Humabalpa, November, 1857, *Spruce* 6273 (fragments of type coll. in Gray Herb. and herb. Sherff; photograph in U. S. Nat. Herb.).

Described by Spruce as a climbing herb, but probably, like the other species of the genus, either shrubby or suffrutescent. The heads examined have only young achenes. In these the awns, borne on a definite although short neck, are usually in two groups of 5 or sometimes 6 over the angles of the achene, agreeing in this respect with those of the other two species, but they do not seem to be united at base. In a few achenes, however, there were 2 or 3 shorter awns on each side of the achene between the main groups of awns. One achene examined bore altogether 15 awns, 5 each in the two groups and 5 smaller ones between them. From the appearance of some of the young achenes, it seems probable that a narrow wing is developed at maturity, at least in some cases.

3. **Cyathomone** Blake, gen. nov.

Shrub (?); leaves opposite, petioled, biternate or pinnate-ternate, membranaceous; heads 7 to 15, cymose, nodding, long-peduncled; involucre double, as in *Bidens*, the outer phyllaries about 5, herbaceous, the inner longer, submembranous; receptacle convex, the pales flattish, membranous, lineate; flowers unknown; achenes strongly obcompressed, the body narrowly obovate, contracted at apex, with two broad, ciliolate, somewhat pectinate-lobate wings, these usually adnate to the pappus cup; pappus of 2 very fragile retrorsely hispid awns and a turbinate, spinulose-ciliolate, persistent corona about 1 mm. high.

Type species *Narvalina sodiroi* Hieron.

1. **Cyathomone sodiroi** (Hieron.) Blake. Fig. 1, *d*.

Narvalina sodiroi Hieron. Bot. Jahrb. Engler **29**: 50. 1900.

SPECIMEN EXAMINED: ECUADOR: Subtropical woods along the Río Pilatón, *Sodiro* 44/3 (fragments of type coll.; U. S. Nat. Herb. no. 1,059,380).

The generic name, from *κναφος, cup*, and *μονη, an abiding*, refers to the persistent corona.

BOTANY.—*Three new plants of the family* Rubiaceae *from Trinidad.*

N. L. BRITTON, New York Botanical Garden, and PAUL C. STANDLEY, U. S. National Museum.

Study of a collection of plants received by the New York Botanical Garden as a loan from the Trinidad Botanic Garden has revealed material of many interesting plants, particularly some not previously recorded from Trinidad. Among them are the three species of